IN THE SPECIFICATION

1. On page 1, lines 17-29 of the specification, please amend the text as follows:

-- It has recently been demonstrated that the propagation speed of light pulses can be dramatically affected and controlled, and even effectively "stopped" for short periods of time. See Chien Liu, et al, "Observation of coherent optical information storage in an atomic medium using halted light pulses", Nature, (January 2001) (advanced publication), herein after referred to as "~~Lui~~ Liu"; D. F. Phillips, A. Fleischhauer, A. Mair, R. L. Walsworth and M. D. Lukin from the Harvard-Smithsonian Center for Astrophysics, publishing in *Physical Review Letters* 86, 783 (29 January 2001) , hereinafter "Phillips"; Hau, L. V., Harris, S. E., Dutton, Z. & Behroozi, C. H. "Light speed reduction to 17 metres per second in an ultracold atomic gas", Nature 397, 594±598 (1999); Kash, M. M. et al. Ultraslow group velocity and enhanced nonlinear optical effects in a coherently driven hot atomic gas. Phys. Rev. Lett. 82, 5229±5232 (1999); Budker, D., Kimball, D. F., Rochester, S. M. & Yashchuk, V. V. Nonlinear magneto-optics and reduced group velocity of light in atomic vapor with slow ground --

2. On page 2, lines 3-29 of the specification, please amend the text as follows:

-- Electromagnetically induced transparency (EIT) has been observed in various atom-gas systems, as is disclosed in, for example, H. R. Gray et al., Opt. Lett. 3, 218 (1978); M. Kaivola et al., Opt. Commun., 49, 418 (1984); A. Aspect et al., Phys. Reve. Lett. 61, 826 (1988); S. Adachi et al., Opt. Commun., 81, 364 (1991); A. M. Akulsin et al., Opt. Commun., 84, 139 (1991); Y. Q. Li et al., Phys. Rev., A51, R1754 (1995); A. Kasapi et al., Phys. Rev. Lett. 74, 2447 (1995). Liu showed that coherent optical information can be stored in an atomic medium and subsequently read out by using the effect of EIT in a magnetically trapped, heavily cooled Bose-Einstein condensed (BEC) sodium atom cloud. The apparatus of Liu al is reproduced (simplified diagram) herein as Fig. 1. It has been experimentally verified by Liu[[.]] that the repeated and reliable storage of quantum state information associated with a light pulse, and the subsequent "read-out" thereof, are controlled substantially by stimulated photon transfer between two laser fields, specifically those associated with the "probe" resonant pulse and the coupling or interference-producing laser. It has further been experimentally demonstrated that multiple such "read-outs" of a stored pulse can be achieved through the application of a series of short, coupling laser pulses (see, e.g., Fig. 4a and 4b of Liu cited above). As illustrated in Figs. 4a and 4b of Liu, measurements of multiple (e.g., double and triple) pulse read-outs spaced by up to hundreds of microseconds may be produced using the aforementioned techniques. Advantageously, each of the regenerated probe pulses in such multiple readouts contains a portion of the contents of the atomic memory, notably in the form of

energy (i.e., the total energy of the multiple pulses is equivalent to that for a single read-out pulse obtained using a longer coupling laser pulse). Successive depletion of the "quantum memory" occurs for each successive pulse. As pointed out by Liu, et al., such capability is potentially useful for quantum information transfer. Through injection of multiple such "probe" pulses into a Bose-Einstein condensate (e.g., cooled sodium cloud), in which most atomic collisions are coherence-preserving, quantum information processing may be possible during the storage time.--

3. At page 8, line 27 of the specification, please insert the following text after the sentence ending with "...the network of Fig. 10a." and before the sentence beginning with "Fig. 11 is a logical flow diagram...":

-- Fig. 10c is a graphical representation of an exemplary pulse propagation scheme according to the present invention.--

4. On page 20, lines 1-20 of the specification, please amend the text as follows:

-- elongate cylindrical vessel having apertures 330, 332 at each distal end adapted to receive the distal end of the input fiber. The chamber is mechanically adapted to withstand the extremely low temperatures of the sodium (Na) BEC cloud (and non-condensed state particles) contained therein. In one embodiment, DT 304 stainless steel is used as the chamber material, although other materials (such as inconel, titanium, ceramics, or even certain polymers) may be used with proper adaptation. Evaporative cooling apparatus of the type well known in the art is coupled to the chamber, as described in greater detail below. A series of pinhole apertures 340 are aligned with the input and output fibers such that the portion of the co-propagating laser energy which passes through BEC cloud 388 condensed within the central region of the [[chamber204]] <u>chamber 304</u> is collimated; i.e., only energy passing through both apertures 340 and the input fiber will be received and coupled to the output fiber 314. The interior dimensions of the chamber 304 are approximately right cylindrical, and a total chamber volume of 1.03 E09 microns^3. The atomic Na cloud of the embodiment described above with respect to Fig. 3 is on the order of 1 E10 atoms, based on density of approximately 10 atoms per cubic micron after laser cooling and evaporation. It will be noted that while sodium is chosen as the atomic species in the embodiments illustrated herein, other atomic species, such as He^4 , having a lambda-type phase change at approximately 2.2 degrees K (corresponding to onset Bose-Einstein condensation), may be used as a substitute, assuming that the apparatus is properly adapted therefore.--

5. On page 23, lines 23-29 of the specification, please amend the text as follows:

-- Note that as illustrated in the embodiment of Fig. 6, the probe laser pulse(s) may alternatively be split off the main transmission fiber 312 using, for example, an X/Y splitter 604 of the type well known in the art, where X and Y represent the fractions of the total transmitted energy split off and remaining in the original fiber after the splitter, respectively. In this fashion, the probe laser signal is parasitic on the main transmission fiber 312. The delayed signal [[(i..,]] (i.e., after exit from the chamber and subsequent depolarization and splitting) may subsequently be reintegrated with the main fiber using, --

6. On page 25, line 30 to page 26, 16 of the specification, please amend the text as follows:

-- In the present embodiment, the desired total time delay is input to an algorithm running on a high speed digital (e.g., RISC) processor 399 ~~(not shown)~~, the algorithm and processor being adapted to perform the iterative time delay network calculations and generate (i) the variable time delays τ_n ; and (ii) number of iterations (n) required, based on known path length delays d_p. The instruction set of the processor is specifically adapted to efficiently perform the iterative processing computations associated with the delay algorithm. Control of the optical modulators 307 controlling the variable delay of each chamber delay iteration is accomplished using a microcontroller coupled to the aforementioned RISC processor, as is well known in the electronic arts. Note that due to switching, instruction cycle, interconnection, and other times associated with the operation of the algorithm on the RISC processor (and microcontroller), a minimum delay period τ_m is established. This results from the aforementioned processing components being unable to calculate and effect the desired delay in the apparatus fast enough to fall within the delay period. Accordingly, where extremely fast response (i.e., low delay times) are required, the optical triggering apparatus of Fig. 3, or alternatively, "fast" electronic devices specifically adapted for high-speed operation (such as that used in nuclear event counting and scaling instrumentation) may be substituted. --

7. On page 30, lines 26-27 of the specification, please amend the text as follows:

--Referring now to Figs. 10a-10c~~10d~~, an optical repeater according to the invention is described.--